

The Interactions between Faults and the Matrix in Paintbrush Group Nonwelded Tuff at Yucca Mountain

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Abstract

To investigate the potential for fast flow through altered tuff of the nonwelded unit of the Paintbrush Group (PTn) at Yucca Mountain, Nevada, we carried out *in situ* field experiments using water released directly into the matrix and along a minor subvertical normal fault at Alcove 4 in Yucca Mountain's Exploratory Studies Facility. During the experiments, changes in moisture content were monitored within the test bed, and a slot excavated below the test bed was visually inspected for seepage. Our field tests suggest that the dry porous PTn matrix is capable of attenuating episodic percolation fluxes in localized areas (such as around faults) where fast flow would be expected to dominate. Once wetted, the matrix is able to retain the moisture over a period of months. As saturation increases in the matrix, less water imbibes along the fault and more water travels farther along the fault. From this observation, we infer that a sequence of infiltration events separated by periods of up to a few months could convey water over increasing distances along the fault.

Keywords: fault-matrix interaction, nonwelded tuff, unsaturated zone, conceptual models, Yucca Mountain
